What is claimed is:

1. A system for dividing a single flow into two or more secondary flows of desired ratios, comprising:

an inlet adapted to receive the single flow;

at least two secondary flow lines connected to the inlet;

an input device adapted to receive at least one desired ratio of flow;

at least one in-situ process monitor providing measurements of products produced by each of the flows lines; and

a controller connected to the input device and the in-situ process monitor and programmed to,

receive the desired ratio of flow through the input device,

receive the product measurements from the in-situ process monitor,

calculate a corrected ratio of flow based upon the desired ratio of flow and the product measurements.

2. A system according to claim 1, further comprising separate process chambers connected to each flow line.

3. A system according to claim 2, wherein each process chamber includes at least one of the in-situ process monitors for providing measurements of semiconductor wafers within each process chamber.

4. A system according to claim 3, wherein the measurements provided by the in-situ process monitors comprise film thickness measurements of each wafer.

5. A system according to claim 1, further comprising a single process chamber connected to all of the flow lines, and a semiconductor wafer positioned in the process chamber is divided into zones corresponding to the flow lines.

6. A system according to claim 5, wherein the flow lines are connected to a showerhead of the process chamber.

7. A system according to claim 5, wherein the process chamber includes at least one of the in-situ process monitors for providing measurements of each of the zones of the semiconductor wafer within the process chamber.

8. A system according to claim 7, wherein the measurements provided by the in-situ process monitor comprise film thickness measurements of each zone.

9. A system according to claim 1, wherein the system comprises two flow lines, the in-situ process monitor provides two of the measurements M_1 and M_2, and the controller is programmed to calculate a process uniformity error $\varepsilon_m = k_m/2\ [(M_1-M_2)/(M_1+M_2)]$, wherein k_m is an arbitrary positive scalar constant, and then calculate the corrected ratio of flow based upon the desired ratio of flow and the process uniformity error ε_m.

10. A system according to claim 1, wherein the corrected ratio of flow is equal to the desired ratio of flow multiplied by the process uniformity error ε_m.

11. A system according to claim 1, wherein the in-situ process monitor is a differential sensor.

12. A system according to claim 11, wherein the in-situ process monitor obtains measurements by monitoring a ratio of reflected light and emitted light from a light source.

13. A system according to claim 1, wherein each flow line includes a flow meter measuring flow through the flow line, and a valve controlling flow through the flow line, and wherein the controller receives measured flows from the flow meters, calculate an actual ratio of flow through the flow lines based upon the measured flows, compares the actual ratio to the corrected ratio of flow, calculates a desired flow through at least one of the flow lines if the actual ratio is unequal to the compensated desired ratio, and provides the desired flow to at least one of the valves.

14. A system according to claim 13, wherein the desired flow is substantially equal to $K_p(\alpha - \alpha_{sp}) + K_i\int(\alpha - \alpha_{sp})_{dt}$, wherein K_p is a proportional gain, K_i is an integral gain, α is the actual flow ratio, and α_{sp} is the corrected flow ratio.

15. A system according to claim 13, further comprising a pressure sensor measuring pressure in the inlet.

16. A system according to claim 15, wherein the controller is programmed to provide a signal indicative of the desired flow to the valve of the first flow line substantially equal to $K_{p\alpha}(\alpha - \alpha_{sp}) + K_{i\alpha}\int(\alpha - \alpha_{sp})_{dt}$, wherein $K_{p\alpha}$ is a proportional gain for ratio control, $K_{i\alpha}$ is an integral gain for ratio control, α is the actual flow ratio, and α_{sp} is the corrected flow ratio.

17. A system according to claim 16, wherein the controller is programmed to provide a signal indicative of the desired flow to the valve of the second flow line substantially equal to $K_{pp}(P_{in} - P_t) + K_{ip}\int(P_{in} - P_t)_{dt}$, wherein K_{pp} is a proportional gain for pressure control, K_{ip} is an integral gain for pressure control, P_{in} is the measured inlet pressure, and P_t is an operating pressure threshold.

18. A method for dividing a single flow into two or more secondary flows of desired ratios, comprising:

dividing a single flow into at least two flow lines;

measuring flow through each flow line;

receiving at least one desired ratio of flow;

measuring products produced by each of the flows lines in-situ;

calculating a corrected ratio of flow based upon the desired ratio of flow and the product measurements;

calculating an actual ratio of mass flow through the flow lines based upon the measured flows;

calculating a desired flow through at least one of the flow lines if the actual ratio does not equal the corrected ratio; and

regulating the flow line to the desired flow.

19. A method according to claim 18, wherein:

the single mass flow is divided into first and second flow lines;

the first flow line is regulated to a first desired flow;

a second desired flow is calculated using the desired ratio and the first desired flow if the actual ratio is unequal to the corrected ratio; and

the second flow line is regulated to the second desired flow.

20. A method according to claim 19, wherein the first desired flow causes the first line to be fully open.

21. A method according to claim 18, wherein the desired flow is substantially equal to $K_p(\alpha - \alpha_{sp}) + K_i\int(\alpha - \alpha_{sp})_{dt}$, wherein K_p is a proportional gain, K_i is an integral gain, α is the actual flow ratio, and α_{sp} is the corrected flow ratio.

22. A method according to claim 18, further comprising measuring pressure in the inlets.

23. A method according to claim 22, wherein the desired flow in one of the flow lines is substantially equal to $K_{p\alpha}(\alpha - \alpha_{sp}) + K_{i\alpha}\int(\alpha - \alpha_{sp})_{dt}$, wherein $K_{p\alpha}$ is a proportional gain for ratio control, $K_{i\alpha}$ is an integral gain for ratio control, α is the actual flow ratio, and α_{sp} is the corrected flow ratio.

24. A method according to claim 22, wherein the desired flow in one of the flow lines is substantially equal to $K_{pp}(P_{in} - P_t) + K_{ip}\int(P_{in} - P_t)_{dt}$, wherein K_{pp} is a proportional gain for pressure control, K_{ip} is an integral gain for pressure control, P_{in} is the measured inlet pressure, and P_t is an operating pressure threshold.

25. A method according to claim 18, further comprising connecting each flow lines to a separate process chamber.

26. A method according to claim 18, further comprising connecting a single process chamber to all of the flow lines.

27. A method according to claim 26, wherein the flow lines are connected to a showerhead of the process chamber.

28. A method according to claim 18, wherein the corrected ratio of flow is based upon the desired ratio of flow and a process uniformity error $\varepsilon_m = k_m/2\ [(M_1-M_2)/(M_1+M_2)]$, wherein k_m is an arbitrary positive scalar constant, and M_1 and M_2 are the in-situ measurements of products produced by each flow line.

29. A method according to claim 28, wherein the corrected ratio of flow is equal to the desired ratio of flow multiplied by the process uniformity error ε_m.

30. A method according to claim 18, wherein the in-situ measurements of products comprise differential measurements.

31. A method according to claim 18, wherein the in-situ measurements of products are obtained by monitoring a ratio of reflected light and emitted light from a light source.